

UTILITY  
PATENT APPLICATION  
TRANSMITTAL

Attorney Docket No.

P99,1885

First Named Inventor or Application Identifier

Klaus Buchenrieder et al,

Express Mail Label No: #EL412789652US

ADDRESS TO: Assistant Commissioner for Patents  
Box Patent Application  
Washington, DC 20231

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ACCOMPANYING APPLICATION PARTS

1. ☒ Specification [Total Pages 9 ]  
2. ☒ Drawing(s) (35USC 113) [Total Pages 1 ]  
3. ☒ Declaration and Power of Attorney [Total Pages 2 ]  
a. ☐ Newly executed declaration (Original copy)  
b. ☐ Copy from prior application (37CFR 1.63(d))  
(for continuation/divisional with Box 14 completed)  
i. ☐ [Note Box 4 Below]  
DELETION OF INVENTOR(S)  
Signed statement attached deleting  
inventor(s) named in the prior application,  
see 37 CFR 1.63(d)(2) and 1.33(b).  
4. ☐ Incorporation By Reference (usable if Box 3b is checked)  
The entire disclosure of the prior application, from which a  
copy of the oath or declaration is supplied under Box 3b,  
is considered as being part of the disclosure of the  
accompanying application and is hereby incorporated by  
reference therein.

5. ☐ Assignment Papers (cover sheet & documentation)  
6. ☒ Letter under 37 CFR 1.41(c).  
7. ☐ English Translation Document (if applicable)  
8. ☒ Information Disclosure Statement (IDS)/PTO-1449 ☒ Copies of IDS Citations  
9. ☐ Preliminary Amendment  
10. ☒ Return Receipt Postcard (MPEP 503)  
(Should be specifically itemized)  
11. ☐ Small Entity Statement filed in prior application, Status still proper and desired  
12. ☐ Certified Copy of Priority Document(s) German Application No. 198 44 942.9 filed September 30, 1998  
13. ☐ Other:

14. If a CONTINUING APPLICATION, check appropriate box and supply the requisite information:

☐ Continuation ☐ Divisional ☐ Continuation-in-part (CIP) ☐ of prior application No: 1

CLAIMS AS FILED

(1) FOR	(2) NUMBER FILED	(3) NUMBER EXTRA	(4) RATE	(5) BASIC FEE \$760.00
TOTAL CLAIMS 20	4			
INDEPENDENT CLAIMS 3	1			
	ANY MULTIPLE DEPENDENT CLAIMS? ( ) YES (X) NO			
			TOTAL FILING FEE ->	\$760.00

☒ The Commissioner is hereby authorized to charge any additional fees which may be required in connection with this application, or credit any overpayment to ACCOUNT NO. 08-2290. A duplicate copy of this sheet is enclosed.

☒ A check in the amount of \$ 760.00 to cover the filing fee is enclosed.

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DATE: September 30, 1999

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September 30, 1999

Hon. Assistant Commissioner for Patents  
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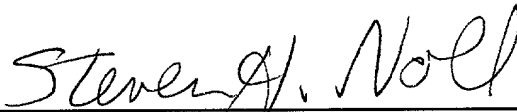
Re: Proposed Patent Application for KLAUS BUCHENRIEDER, RAINER  
KRESS and ALEXANDER SEDLMEIER entitled "METHOD FOR  
OPERATING A NETWORK COMPUTER" Attorney Docket No. P99,1885

SIR:

Under the provisions of 37 CFR § 1.41 (c), I am filing the attached application with 4 claims, 1 sheet of informal drawings and filing fee on behalf of KLAUS BUCHENRIEDER, RAINER KRESS and ALEXANDER SEDLMEIER and request that the application papers be assigned a serial number and filing date.

I request that the application be assigned a Serial No. and Filing Date pursuant to the provisions of 37 C.F.R. § 1.53(b) and 37 C.F.R. § 1.53(f).

Respectfully submitted,



Steven H. Noll (Reg. No. 28,982)  
Attorney for Applicant

65060" 67350460

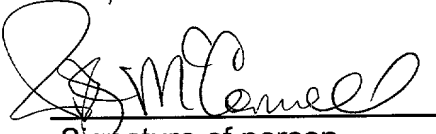
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Date of Deposit: September 30, 1999

I hereby certify that the following is being deposited with the United States Postal "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to The Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Proposed Patent Application for KLAUS BUCHENRIEDER, RAINER KRESS and ALEXANDER SEDLMEIER entitled "METHOD FOR OPERATING A NETWORK COMPUTER", consisting of specification, claims, 1 sheet of informal drawings, Information Disclosure Statement and Government Filing Fee, Attorney Docket No. P99,1885



Signature of person  
mailing application

Name of person mailing  
application

650660"ET350460

# **SPECIFICATION**

## **TITLE**

### **METHOD FOR OPERATING A NETWORK COMPUTER**

#### **BACKGROUND OF THE INVENTION**

##### **Field of the Invention**

The present invention relates to a method for operating a network computer wherein the computer has reconfigurable hardware which can be connected to the network and which, accordingly, is dynamically structurable via the network.

##### **Description of the Prior Art**

Network computers are known which receive programs from a server. Such network computers, such as those offered by Sun Microsystems, are those which are situated at the user. Generally, such a network computer includes a monitor, a keyboard, a CPU, a memory and an interface for the access to a network. A central computer is not only responsible for the data administration, as given client and/or server, but also responsible for the applications. The required program parts are loaded and conducted via the network for starting an application at the network computer in order to process data; for example, to carry out word processing. Further required program parts are automatically reloaded. All data is centrally stored. One advantage is the small administrative expenditure at the user workstation (see publications of the company Sun Microsystems with the title "JavaStation - An Overview" 1996, retrievable under <http://www.sun.com/javastation/whitepapers/javastation>).

These network computers are supported by networks such as intranets or internet. The hardware architecture of such a network computer is fixed. Further connections of computers via networks are standard; given workstations, for example. One can gain access to data of other computers via the network (Ethernet, for example) or individual program parts. What is referred to as tasks or complete programs can be started by remote control on other computers and can be calculated.

The present invention is, therefore, based on the object of providing a method for the operation of a network computer that can be structured.

## **SUMMARY OF THE INVENTION**

Accordingly, pursuant to the teachings of the present invention, a preferred and advantageous method for the operation of a structurable computer which is connected to a network is provided which includes the steps of:

- independent loading and/or loading in response to a specific request of configuration data, that is allocated to this computer, into the computer via the network;
- configuring the hardware of the computer corresponding to this configuration data; and
- processing a task with the computer configured this way.

A specific advantage of the structurable computer is that it is dynamically structurable via the network; i.e., that the configuration of the hardware can be dynamically changed via the network.

In an embodiment, a method for the dynamic structuring of the structurable computer, which method is advantageously compatible with the method given above, includes the steps of:

- processing a task with the computer configured for this task;
- configuring, already before completion of the processing of this task, a part of the hardware of the computer that is no longer necessary for this processing, for the processing of a different task by loading the configuration data allocated to this other task into the computer via the network.

The calculating speed can be considerably increased by such a dynamic structuring, particularly when the part of the hardware of the computer that is no longer necessary for the processing of the one task is configured for the processing of the other task such that the processing of the other task already can be started before the processing of the one task has been completed.

Apart from the advantage of the dynamic reconfigurability, the structurable network computer has the advantages that it is expandable in a modular manner and that it can efficiently solve dedicated programmed problems as either a composite or individually.

Structurable in the above sense means that the network computer initially does not exhibit a structure; i.e., that all hardware resources are the same. Subsequent to the programming or configuration, the network computer exhibits a structure for a specific task. The structure can be changed at any time and can be adjusted to a new task by reconfiguration.

Dynamic reconfiguring means that the configuration also may occur during the running time; i.e., that a different part of the computer already can be reconfigured while the structurable network computer processes a task. The structurable network computer independently can establish contact either with other processor elements via the network, with other network computers or with normal host computers, for example, in order to solve problems or provide support with respect to their processing.

Additional features and advantages of the present invention are described in, and will appear from, the Detailed Description of the Preferred Embodiments and the Drawing.

### **DESCRIPTION OF THE DRAWING**

Figure 1 shows a structurable network computer in accordance with the present invention that is connected to a network by an interface; and

Figure 2 shows a plurality of network computers that are respectively connected to a network by an interface.

### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

The structurable network computer that is generally referred to as 1 has a reconfigurable hardware or hardware platform 10 that can be connected to a network 2 (the Internet or Intranet, for example), via an interface 101. The hardware or hardware platform 10 has, in turn, one FPGA 11, a plurality of FPGAs 11, one FPGA 11, a plurality of FPGAs 11 and one processor 12, a plurality of processors 12 and one storage (memory) 13 or a plurality of storages 13.

All FPGAs and, as warranted, processors 12 and storages 13 are connected to the interface 101. The hardware 10 can be accessed via the network 2 by this interface 101 for an acceleration of algorithms and/or an emulation of ASICs for example.

A user of the computer 1 can have direct access to the hardware 10 by a further, but not necessary, interface 102. When turned on, or in response to a specific request of configuration data allocated to it, the computer 1 or the hardware 10 loads itself via the network 2 and subsequently behaves corresponding to its configuration.

Initially, the computer 1 does not have a structure - all hardware resources being the same. Given activation or a specific request, the computer 1 structures itself for a dedicated task. The structure can be changed for a new task at any time. The configuration code is centrally managed on a server, for example.

The computer 1 can dynamically reload parts of the configuration; i.e., that it configures a part of its hardware 10 while a calculation has not yet completed in another part. Therewith, it enables the solving of complex problems which would not have completely fit on the available hardware resources. The configuration data is centrally managed and can be retrieved via the network, if required.

When a plurality of these computers 1 are connected to a network 2, as shown in Figure 2, it is possible that they both support each other and support a network computer (not shown), which only has a processor and a memory and does not have FPGAs. It can be, for example, proceeded such that a computer 1 that has to execute a task deposits a list 3, which is available to all other network computers and has all tasks to be processed, in a storage of another computer 1. A computer 1 that is free at that time looks for a task in this list 3. A FFT (Fast Fourier Transformation) for example, takes the necessary configuration data from a central server and configures itself specifically for this task. As a specialist, it can execute this task highly efficiently and fast. Subsequent to the execution, it returns the calculated data to the original computer.

The network computer communicates with other network computers via what is referred to as objects, for example. The object includes three components, for example: Routing, code and data. The routing component indicates where to send the object. The code component includes two sections, a software part and a hardware part. Both parts are functionally equivalent. The software is executed on a virtual machine in the network computer. What is thereby guaranteed is that the software can be executed on each

arbitrary network computer. However, the network computers can differ with respect to their speed, for example. When the execution occurs in hardware, a configurable part of the network computer is configured with the aid of the code in the hardware part of the object. The code is designed such that it can run on a plurality of different hardware platforms that are to be configured. The software part and the hardware part are optional. Therefore, pure data objects or objects without a hardware part also can be sent. The data component contains private data of the object.

A possible embodiment of an object is described below, by way of example, whereby the executing network computer, which wishes to execute a program, is referred to as network computer A and the network computer, which receives a data object, is referred to as network computer B.

1. The network computer A sends a call to all network computers that are situated in the network to send it information about their free resources.
2. The answering network computers send their routing information and their information about free resources. Further information is contained therein, such as those functions that the computer is particularly good at.

A version for the general calling of network computer A: Instead of sending a call to all, the network computer A also can ask an information master, if present, for the corresponding information.

3. A network computer A chooses a network computer, the network computer B for example. It attaches the corresponding routing information to the object to be calculated and sends the object.
4. The network computer B receives the object, calculates it and returns the calculated data as a new object. The calculation may occur in software, hardware or mixed.

A network computer can be connected to the network or disconnected to the network at any time.

An object with calculated results is only released by the calling network computer when



- a) further calculations can be calculated independently of the predecessor, or
- b) when calculations that are dependent on one another are entirely completed.

The network computer B also can assign suborders in that it, in turn, forwards an object.

An object can contain security information. Individual network computers, groups or network segments can be given, for example. Other network computers are then not considered.

Network computers can exchange their objects in an encoded fashion, via PGP (Pretty Good Privacy Encoding), for example. For this purpose, network computer B can send its public key to network computer A, for example. Network computer A can therewith encode the object. The object can be decoded only by network computer B, since it is the only one with the private key.

Although the present invention has been described with reference to specific embodiments, those of skill in the art will recognize that changes may be made thereto without departing from the spirit and scope of the invention as set forth in the hereafter appended claims.

**We Claim as Our Invention:**

1. A method for operating a first computer that is connected to a network, the method comprising the steps of:

loading first configuration data for a first task, allocated to the first computer, into the first computer via the network wherein the loading is initiated either independently or in response to a specific request;

configuring the hardware of the first computer corresponding to the first configuration data, and

processing the first task with the first computer configured with the first configuration data.

2. A method for operating a first computer as claimed in claim 1, further comprising the step of:

configuring, prior to completion of the step of processing the first task, a part of the hardware of the first computer that is no longer necessary for the step of processing the first task, for processing a second task by loading second configuration data allocated to the second task into the first computer via the network.

3. A method as claimed in claim 2, further comprising the step of:  
processing the second task prior to the completion of the step of processing the first task.

4. A method for operating a first computer as claimed in claim 1, further comprising the steps of:

sending a call, inquiring about free resources, via the first computer to all other computers connected to the network;

sending both respective routing information and respective free resource information from the other computers to the first computer;

selecting one of the other computers with the first computer;

sending both an object to be calculated and the respective routing information of the selected one computer to the selected one computer;

calculating the object at the selected one computer to obtain calculated data as a new object; and

returning the new object to the first computer.

### **ABSTRACT OF THE DISCLOSURE**

A method for operating a network computer wherein the network computer has reconfigurable hardware that can be connected to a network. The hardware includes one FPGA, a plurality of FPGAs, or a plurality of FPGAs with processors and memory. Advantageously, the computer is dynamically structurable via the network.

FIG 1

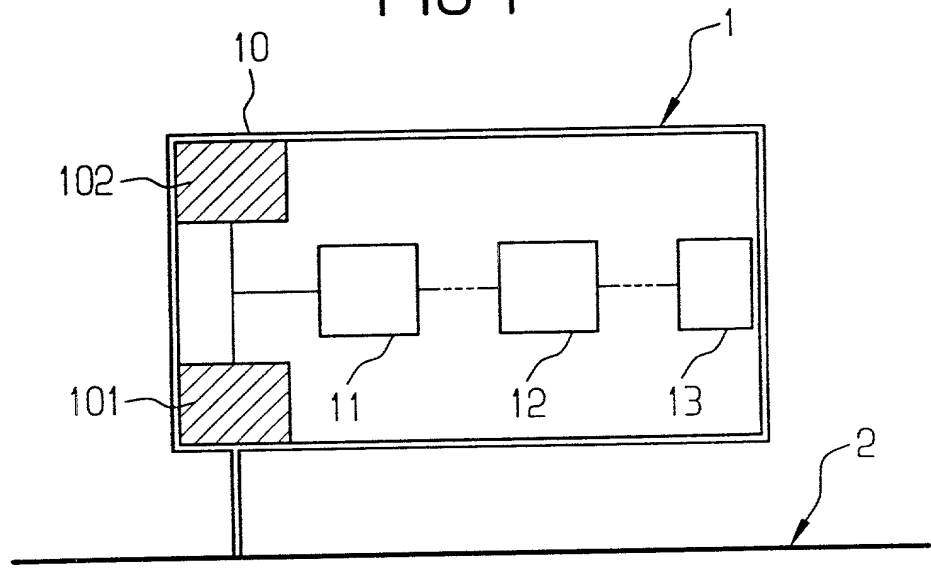
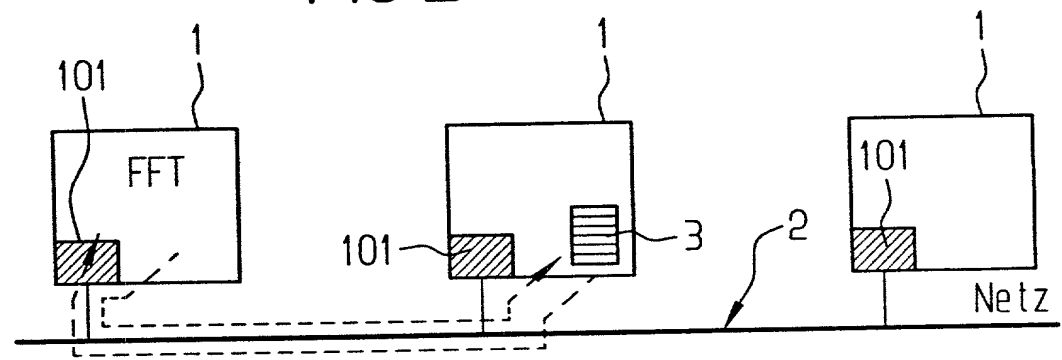


FIG 2



## DECLARATION AND POWER OF ATTORNEY

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

### METHOD FOR OPERATING A NETWORK COMPUTER

Case No. P99,1885, the specification of which

(check  
one) ☒ is attached hereto.  
☐ was filed on \_\_\_\_\_, as  
Application Serial No. \_\_\_\_\_  
and was amended on \_\_\_\_\_  
(if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose to the United States Patent Office all information which is known to me to be material to the patentability of this application in accordance with Title 37, Code of Federal Regulations, 1.56.<sup>1</sup>

I do not know and do not believe this invention was ever known or used in the United States of America before my or our invention thereof, or patented or described in any printed publication in any country before my or our invention thereof or more than one year prior to this application, that the same was not in public use or on sale in the United States of America more than one year prior to this application, and I believe that the invention has not been patented or made the subject of an inventor's certificate issued before the date of this application in any country foreign to the United States of America on an application filed by me or my legal representatives or assigns more than twelve months prior to this application, and that no application for patent or inventor's certificate on this invention has been filed in any country foreign to the United States of America prior to this application by me or my legal representatives or assigns, except as identified below:

I hereby claim foreign priority benefits under Title 35, United States Code, 119 of any foreign application(s) for patent or inventor's certificate listed below

Prior Foreign Application(s) Number	Country	Date
19844942.9	Fed. Rep. Of Germany	September 30, 1998

and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the above listed application on which priority is claimed:

Prior Foreign Application(s) Number	Country	Date
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<sup>1</sup> (b) Under this section, information is material to patentability when it is not cumulative to information already of record or being made of record in the application, and

(1) It establishes, by itself or in combination with other information, a *prima facie* case of unpatentability of a claim; or

(2) It refutes, or is inconsistent with, a position the applicant takes in:

(i) Opposing an argument of unpatentability relied on by the Office, or

(ii) Asserting an argument of patentability.

A *prima facie* case of unpatentability is established when the information compels a conclusion that a claim is unpatentable under the preponderance of evidence, burden-of-proof standard, giving each term in the claim its broadest reasonable construction consistent with the specification, and before any consideration is given to evidence which may be submitted in an attempt to establish a contrary conclusion of patentability.

If no priority is claimed, I have identified all foreign patent applications filed prior to this application:  
Prior Foreign Application(s)  
Number Country Date

And I hereby appoint Messrs. John D. Simpson (Registration No. 19,842), Dennis A. Gross (24,410), Robert M. Barrett, (30,142), Steven H. Noll (28,982), Kevin W. Guynn (29,927), Robert M. Ward (26,517), Brett A. Valiquet (27,841), Edward A. Lehman (22,312), David R. Metzger (32,919), Todd S. Parkhurst (26,494), James D. Hobart (24,149), Melvin A. Robinson (31,870), John R. Garrett (27,888), Joseph P. Reagen (35,332), Michael R. Hull (35,902), Michael S. Leonard (37,557), William E. Vaughan (39,056) and Lewis T. Steadman (17,074), all members of the firm of Hill & Simpson, A Professional Corporation

Telephone: 312/876-0200 Ext. 3491

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85th Floor Sears Tower, Chicago, Illinois 60606

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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